

PATENT COOPERATION TREATY

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From the INTERNATIONAL SEARCHING AUTHORITY

PCT

HENNEMAN & ASSOCIATES PLC

To: LARRY E. HENNEMAN, JR.
HENNEMAN & ASSOCIATES, PLC
714 W. MICHIGAN AVENUE
THREE RIVERS, MI 49093

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing
(day/month/year) **02 AUG 2007**

Applicant's or agent's file reference
0025-013P1PCT

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.
PCT/US 06/39521

International filing date
(day/month/year) 10 October 2006 (10.10.2006)

Applicant **FLEXTRONICS AP LLC**

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: +41 22 740 14 35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until **30 months** from the priority date (in some Offices even later); otherwise, the applicant must, within **20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 0025-013P1PCT	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 06/39521	International filing date (day/month/year) 10 October 2006 (10.10.2006)	(Earliest) Priority Date (day/month/year) 11 October 2005 (11.10.2005)
Applicant FLEXTRONICS AP LLC		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II)

3. ☐ **Unity of invention is lacking** (see Box No. III)

4. With regard to the **title**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 16
☒ as suggested by the applicant
☐ as selected by this Authority, because the applicant failed to suggest a figure
☐ as selected by this Authority, because this figure better characterizes the invention
- b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 06/39521

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8): H04N 5/225 (2007.01)

USPC: 348/374

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

USPC: 348/374

IPC(8): H04N 5/225 (2007.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

US: 257/E31.127; 348/E5.027; 348/E5.028

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PubWEST(PGPB, USPT, USOC, EPAB, JPAB)

Search Terms: camera, integrated, protective cover

GOOGLE: camera lens formed directly on substrate

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/0212947 A1 (SATO et al.) 29 September 2005 (29.09.2005), [abstract], para. [0002], [0004], [0005], [0007], [0011], [0013], [0018], [0028], [0031], [0033], Figs 1, 3-5	1 - 51

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

26 March 2007 (26.03.2007)

Date of mailing of the international search report

02 AUG 2007

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450

Facsimile No. 571-273-3201

Authorized officer:

Lee W. Young

PCT Helpdesk: 571-272-4300

PCT OSP: 571-272-7774

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To: LARRY E. HENNEMAN, JR.
HENNEMAN & ASSOCIATES, PLC
714 W. MICHIGAN AVENUE
THREE RIVERS, MI 49093

Date of mailing
(day/month/year) **02 AUG 2007**

Applicant's or agent's file reference
0025-013P1PCT

FOR FURTHER ACTION
See paragraph 2 below

International application No. PCT/US 06/39521	International filing date (day/month/year) 10 October 2006 (10.10.2006)	Priority date (day/month/year) 11 October 2005 (11.10.2005)
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International Patent Classification (IPC) or both national classification and IPC
IPC(8) - H04N 5/225 (2007.01)
USPC - 348/374

Applicant **FLEXTRONICS AP LLC**

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Date of completion of this opinion
29 March 2007 (29.03.2007)

Authorized officer:
Lee W. Young

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 06/39521

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

- ☐ a sequence listing
- ☐ table(s) related to the sequence listing

b. format of material

- ☐ on paper
- ☐ in electronic form

c. time of filing/furnishing

- ☐ contained in the international application as filed
- ☐ filed together with the international application in electronic form
- ☐ furnished subsequently to this Authority for the purposes of search

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 06/39521

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	4,7, 9,11,14, 18-20,22,27-34,36,43,44,46-48	YES
	Claims	1-3,5, 6, 8, 10,12,13,15-17, 21, 23-26, 35, 37-42,45,49-51	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1 - 51	NO
Industrial applicability (IA)	Claims	1 - 51	YES
	Claims	NONE	NO

2. Citations and explanations:

Claims 1-3, 5, 6, 8, 10, 12, 13, 15-17, 21, 23-26, 35, 37-42, 45, and 49-51 lack novelty under PCT Article 33(2) as being anticipated by US 2005/0212947A1 to Sato et al. (hereinafter 'Sato').

Regarding claims 1, 16, 17, and 37, Sato teaches an apparatus, a method of using the apparatus, and a method of manufacturing a camera module (present invention relates to an image capture apparatus used in an electronic camera, para. [0002], packaging methods for the solid state imaging device, para. [0005]) comprising an image capture integrated circuit chip (solid state imaging device, para. [0005]); a lens (lens, para. [0007]); and a lens holder mounted on the image capture circuit chip, whereby the lens is positioned relative to the image capture integrated circuit chip (cylindrical-shaped lens holding frame, para. [0007]). (Note: claim 1 teaches the combination of the elements of claims 16 and 17.)

Regarding claim 2, 21, and 38 Sato teaches a protective cover disposed over a sensor array of the image capture integrated circuit chip (a protector which covers an outer periphery of the lens holding frame, para. [0013]).

Regarding claim 3, Sato teaches that the lens holder is molded on a top surface of the image capture integrated circuit chip (a protector which covers an outer periphery of the lens holding frame, para. [0013]).

Regarding claims 5, 25, and 41, Sato teaches that the lens holder defines a recess for receiving the lens (Along an inner periphery of a lens holding frame, a groove is formed., [abstract]).

Regarding claim 6, 26, and 42 Sato teaches that the recess positions the lens relative to the image capture integrated circuit chip when the lens is placed in the recess (When the lens holding frame is attached to the solid state imaging device to cover it, the groove of the lens holding frame is engaged to the projection of the solid state imaging device., [abstract]. Note: the lens holding frame holds the lens relative to integrated circuit.).

Regarding claims 8 and 45, Sato teaches that the lens is affixed to the housing such that there is a gap between at least a portion of the lens and the image capture integrated circuit (the spacer is projected from that of the semiconductor substrate and the transparent plate, para. [0012]. Note: the spacer would provide the gap.).

Regarding claim 10, Sato teaches that the lens is a component of a lens assembly (an image sensor chip on which light receiving portion is formed is mounted on a subsidiary substrate, then a ceramic frame is disposed on the subsidiary substrate so as to surround the image sensor chip, and then a transparent plate is disposed on the ceramic frame so as to seal the image sensor chip., para. [0005]).

Regarding claims 12 and 13, Sato teaches at least one electrical contact disposed to electrically couple the image capture integrated circuit chip to an electronic device (the solid state imaging device 40 can be electrically connected to the circuit board 50, para. [0031], Fig. 4,5).

Regarding claims 15, 35 and 49, Sato teaches that the lens holder is mounted on a top surface of the image capture integrated circuit chip within the peripheral limits of the top surface (A groove is formed around an inner peripheral surface of the lens holding portion 34a, so as to fit on a projection which is formed around an outer periphery of the taking lens 32. Accordingly, the taking lens 32 can fit to be held in the lens holding portion 34a., para. [0028], Fig. 3).

Regarding claims 23 and 39, Sato teaches that the protective cover is a molded spacer (The spacer 46 is formed of an inorganic material, para. [0033], Fig. 4).

Regarding claims 24 and 40, Sato teaches that the protective cover is glass (a transparent cover glass, [abstract]).

Regarding claim 50, Sato teaches an electronic communications device comprising: communication circuitry for providing communication with another electronic communications device (a personal computer, a mobile phone, an electronic notepad or the like, para. [0004]); and a camera module (FIG. 1 is a perspective view of a front side of a mobile phone with a camera, para. [0018], Fig. 1) including an image capture integrated circuit chip having a photosensitive area (solid state imaging device, para. [0005]); and a housing mounted entirely on the image capture integrated circuit chip (a ceramic frame is disposed on the subsidiary substrate so as to surround the image sensor chip, para. [0005]).

--(Continued on Supplemental Pages)--

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 06/39521

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claim 51 refers back to claim 62, when it appears that claim 50 was intended. For the purpose of the search the Authority considers that claim 51 intended to refer back to claim 50, however, correction is suggested.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 06/39521

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

2. Citations and explanations:

Regarding claim 51, teaches a circuit substrate including at least a portion of the communication circuitry and wherein the camera module is mounted on the circuit substrate (the solid state imaging device has a structure where a frame-like spacer is disposed on a semiconductor substrate, para. [0011]).

Claims 4, 7, 9, 11, 14, 18-20, 22, 27-34, 36, 43, 44, and 46-48 lack an inventive step under PCT Article 33(3) as being obvious over Sato.

Regarding claim 4, although not explicitly taught in Sato, it would have been obvious to one skilled in the art that the lens holder could be preformed and adhered onto a top surface of the image capture integrated circuit chip, because preforming of parts associated with integrated circuits is well known in the art and often used in mass production to reduce costs.

Regarding claims 7, 27 and 43, although not explicitly taught by Sato, it would have been obvious to one of ordinary skill in the art that the lens holder could include a reference surface for fixing the distance of the lens from the image capture integrated circuit chip. A fixed distance is necessary to focus the lens and a reference surface would be useful in establishing this distance.

Regarding claims 9, Sato teaches a lens coupled to the lens holder (cylindrical-shaped lens holding frame, para. [0007]). Although not explicitly taught, it would be obvious to those of ordinary skill in the art that the lens could be coupled to the lens holder via an adjustable focus mechanism because adjustable focus mechanisms are often used to allow focusing of the lens after final assembly.

Regarding claim 11, although Sato does not explicitly teach that the image capture integrated circuit chip includes a photosensitive area and a non-photosensitive area, or that the lens holder is mounted on the non-photosensitive area so as not to occlude the photosensitive area, however, it would have been obvious by one of ordinary skill in the art to construct the camera taught in Sato in this fashion. It is common knowledge to those of ordinary skill in the art that an integrated circuit chip used as part of a camera assembly often includes a photosensitive area and a non-photosensitive area. If based on design considerations an integrated circuit of this type were chosen, it would be preferable to mount the lens holder so as not to occlude the photosensitive area so that the chip would work properly. That is, the photosensitive area would not be able to receive light and operate as part of a camera if it was blocked by the lens holder, therefore, the lens holder would need to be mounted so as not to block the photosensitive area.

Regarding claims 14, 32, and 46, although not explicitly taught in Sato, it would have been obvious to one of ordinary skill in the art that the lens holder could be formed on a top surface of the image capture integrated circuit chip, and the at least one electrical contact could be formed on a bottom surface of the image capture integrated circuit chip, if desired, based on design considerations. Ultimately, a manufacturer would have many choices as to which integrated chip to use to interface with a lens to make a camera assembly. The location of the lens holder, therefore, would be based on the construction of the integrated chip chosen.

Regarding claims 18, 19, 20, and 22, Sato teaches A solid state imaging device is consisted of an image sensor chip having a light receiving portion, a frame-like spacer attached on the image sensor chip so as to surround the light receiving portion ([abstract]), and also discusses manufacturing methods (In packaging methods for the solid state imaging device, (para. [0005])), however, Sato doesn't explicitly teach a plurality of devices, rather, Sato discusses them with regard to a single apparatus. However, it would have been obvious to those of ordinary skill in the art that the methods used to manufacture a single imaging devices could be applied to a plurality of devices including the following: simultaneously fixing the plurality of lens holders on the substrate - claim 19, separating the plurality of discrete image capture devices after the step of fixing the plurality of lens holders on the substrate - claim 20, placing the protective cover over each of the plurality of image capture devices occurs during the step of fixing the plurality of lens holders on the substrate -claim 22.

Regarding claims 28, 30 and 31, although not explicitly taught in Sato, it would have been obvious to one of ordinary skill in the art that the step of positioning the lens units in the lens holders (or attaching the lens -claim 30, or focusing the lenses -claim 31) could occur when the discrete image capture devices are still an integral part of the substrate. This method of manufacturing is known in the art and may be more cost effective than positioning the lens during a different stage of the process, for instance when the discrete image capture devices are no longer an integral part of the substrate.

Regarding claims 29 and 44, although not explicitly taught in Sato, it would have been obvious to one of ordinary skill in the art to attach a respective lens to each of the plurality of lens holders, because Sato teaches that a lens frame (holder) is provided for a lens (cylindrical-shaped lens holding frame, para. [0007]).

Regarding claims 33 and 48, although not explicitly taught in Sato, it would have been obvious to one of ordinary skill in the art that each of the image capture devices includes could include a via through the substrate (or silicon wafer -claim 48) to connect the image capture circuit with the electrical contact. Vias are well known in the art as a method of connection used in regards to circuit board manufacturing. A via could be used, if so desired, as the method of connection between the image capture circuit and the electrical contact.

Regarding claims 34 and 47, although not explicitly taught in Sato, it would have been obvious to one of ordinary skill in the art that the width of the lens holder could be substantially the same as a width of a respective one of the image capture devices, if so desired, based on design considerations..

Regarding claim 36, although not explicitly taught in Sato, it would have been obvious to one of ordinary skill in the art that separating the discrete image capture devices from one another; and wherein the step of fixing the plurality of lens holders on the substrate includes forming a lens holder entirely on at least one of the plurality of individual image capture devices after the step of separating the discrete image capture devices could be accomplished, if so desired, because it would be necessary to separate the devices in order to use them in separate applications.

Claims 1 - 51 have industrial applicability as defined by PCT Article 33(4), because the subject matter can be made or used in industry.